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Foot & Ankle Development & Deformity Management with Serial Casting - Why & How

A Private Tutorial in Telluride, Colorado – March 24-29, 2009

This course features a review of the development and biomechanics of the foot and ankle complex in the open and closed chain, with minimum soft tissue extensibility requirements for efficient lower extremity functional mobility. Musculoskeletal assessment procedures are reviewed in seminar and in supervised lab sessions, as the findings apply to proper documentation of casting results and a systematic approach to clinical decision-making regarding alignment and posting in casts and orthoses.

Rationale for various hypoextensibility management interventions is supported by a literature review regarding muscle transformation secondary to chronic recruitment as it is currently understood. Spasticity is distinguished from tone and from soft tissue pathophysiologic adaptation, with clinical implications. Discussion includes the use of the contoured plaster footboard, the R-Wrap© orthosis, neurolytics, positioning, stretching, and serial casting.

Gait kinetics principles are discussed and applied to a review of orthotic designs, including pros and cons of currently available, prefabricated and non-cast-molded orthoses.

This course is designed for the practitioner who has experience in working with children or adults with foot and ankle alignment problems associated with CNS dysfunction and ligament laxity. Physical therapists, orthotists, pediatric orthopedists, physicians in physical medicine and rehabilitation are welcome. Ms. Cusick believes that team education fosters more effective teamwork.

As this program is a tutorial, enrollment is limited to 6 clinicians.

Course Objectives

Participants completing this course are expected to be able to:

- § Describe, in plane-based terminology, the motions of the joints and various bones of the foot in the open and closed kinetic/kinematic chains.
- § Discuss the relationship between joint alignment and related muscle function in terms of joint axis inclination, muscle and loading force vectors, lever arm, and resultant moment.
- § Explain the clinical rationale for using specific assessment techniques to identify features of soft tissue extensibility, joint mobility and structural alignment in the ankle and foot.
- § Explain the swing-limb torque generator as it relates to the closed kinetic and kinematic chains in gait.
- § Bring the principles of orthotic posting and kinetics to below-knee cast and orthotic design.
- § Explain the rationale for lifting and loading the heel under a plantarflexed ankle to reduce calf muscle contracture (equinus deformity).
- § Identify the deformities of the foot and ankle that occur most commonly in children and adults with upper neuromotor dysfunction, and describe the components of deformity at each joint in plane-based terms.
- § Discuss the physiology and functional significance of R1 (first-catch) end range encountered on assessing passive extensibility in healthy and in chronically over-recruited muscle groups.
- § Discuss the physiologic and structural changes that occur in muscle and its surrounding tissues in the context of the active length-tension relationship.
- § Explain the physiologic rationale for undertaking serial casting and comparable orthotic interventions gradually and without force.
- § Discuss whether a deformity meets the criteria for intervention with serial casts, neurolytic injection or

medication, an R-wrap orthosis, a plantarflexed AFO with heel lift, stretch splinting, and/or positioning.

- § Define kinetics and kinematics as they pertain to gait.
- § Name the 5 attributes of normal gait according to Perry and Gage.
- § Explain the contribution of ankle plantarflexion at propulsion to energy cost in gait, and discuss the normal development of same.
- § Achieve novice skill level in musculoskeletal assessment of the ankle and foot in the open and closed chains.
- § Achieve novice skill in fabricating and posting a FlexCast© Preparatory AFO, with or without a footboard insert; a plaster footboard (optional); and a combination, below-knee cast using plaster and SoftCast.

Program Schedule

The 5-days will allow time to review handouts, use the library, repeat lectures if needed, and/or practice procedures. This schedule will flex to try to accommodate the abilities and interests of the group. As instructor, I will be on site and available from 8:00AM until 5:30PM each day of the course.

DAY 1: SEMINAR

8:15	Register and settle in.	1:30	Length/Weakness Relationships & Muscle Balance Theory (MBT) (Sahrmann) for the Ankle & Foot
8:30:	Subtalar & Midtarsal Joint Anatomy & Ideal Function	2:00	Muscle Transformation in the Presence of Chronic, Excessive Recruitment (or, why muscles R stupid)
10:00	Break	2:30	Break
10:15	Ideal Ankle, STJ and MTJ Function in Gait – The Swing Limb Torque Generator	3:00	Hypoextensibility Management: Weight-line Training, MBT, Positioning, Neurolytics, Orthoses
		4:00	Serial Casting: Precautions, Contraindications, Limitations, and Guidelines
12:00	Lunch and Library Time	5:00	Discussion/questions
1:00	Kinesiologic & Physiologic Requirements for Optimum Muscle Function	5:15	Adjourn <i>Independent study (optional)</i>

DAY 2: SEMINAR

8:15	Assessing the Foot & Ankle - Review of Open- Chain Assessments to Identify Structural Deviations & Muscle Imbalances	2:00	Kinetics in Gait – Power Sources, Load Line Characteristics
9:45	Break	2:30	Break
10:00	Pathomechanics of Triceps Surae Hypoextensibility & Various Foot Design Problems: Posting Implications	2:45	Review of Orthotic Design Options Relative to Kinetics & the 5 Attributes of Normal Gait
12:00	Lunch, library	5:00	Questions / discussion
1:00	Developmental Features of the Foot & Ankle	5:15	Adjourn (<i>Independent Study (optional)</i>)

Bring shorts or stretchy pants tomorrow

DAY 3: ANKLE AND FOOT ASSESSMENTS LAB (BRING SHORTS TODAY)

8:45	Open-Chain Assessments: Foot Geometry, Joint Mobility, and Soft Tissue Extensibility – Demo and Lab	1:00	LAB: Ankle DFROM
10:00	Break	2:00	LAB: Closed-Chain Foot Assessments
10:15	Resume Open Chain Foot Assessments	3:30	Stay and practice, use the library, watch a case on DVD, and sign out when you're done.
12:00	Lunch		

Bring shorts or stretch pants tomorrow

DAY 4: LAB (BRING SHORTS TODAY)

8:30	Review of Casting Materials	1:00	Footboard/FlexCast Fabrication Demo and Lab
9:15	FlexCast Fabrication & Posting Demo & Lab		
11:15	Footboard Fabrication Demo		When you're done, clean up, stay and practice, use the library, watch a case on DVD, and sign out.
12:00	Lunch		

Bring shorts or stretch pants tomorrow.

DAY 5 – CONTINUED LABS (BRING SHORTS TODAY)

9:00	Positioning the Patient and Rehearsing the Cast Molding Grip
9:30	Plaster and SoftCast Combo Cast Fabrication and Posting Demo and Lab
12:30	Lunch
1:30	Choose your task: read, practice assessment procedures, cast fabrication procedures, etc.
4:30	Clean-Up
5:30	Adjourn

Thank you, and safely home.

INSTRUCTOR BIO - BEVERLY (BILLI) CUSICK, PT, MS, COF

EDUCATION: 1972 - BS in PT from Bouve College at Northeastern University (Boston), summa cum laude.
1988 - MS in Clinical and College Teaching for Allied Health Professionals - University of Kentucky in Lexington.

WORK EXPERIENCE:

- § 9 years on PT staff at Children's Rehabilitation Center (now, Kluge Center) in Charlottesville, VA.
- § 3 years as PT Education faculty of the College of Health Related Professions at MUSC in Charleston, SC, and Director of PT services for the Division of Developmental Disabilities at the Medical University of South Carolina.
- § 1 year, consultant for Cardinal Hill Hospital's Head Trauma and Pediatrics teams - Lexington, KY.
- § 4 years working with and for the PT Departments at Children's Hospital at Stanford, Palo Alto, CA.
- § 18 years in private practice.

CLINICAL TEACHING: **Associate Professor** for the Rocky Mountain University of Health Professions - Pediatrics Program - Provo, Utah (2006-2008).

Guest lecturer for annual conferences of the APTA, the NDTA, and the American Academy of CP and Developmental Medicine, in the US and Canada; at the ISPO Consensus Conference for Orthotics in CP; and for the British Assoc. of Prosthetists and Orthotists.

Invited Instructor of more than 350 courses and guest presentations in the USA, Canada, Brazil, Hong Kong, Italy, Australia, England, Ireland, Israel, India, and New Zealand. Two teaching tours were sponsored by the Australian Physiotherapy Association's Pediatric Special Interest Group.

Since 1993 Ms. Cusick has been consulting and practicing privately in or near Telluride, Colorado. There, she devotes most of her professional effort to generating literature and educational materials, to developing therapeutic products, including TheraTogs, and to teaching and consultation.

PUBLICATIONS:

- § *Progressive Casting and Splinting for Lower Extremity Deformity in Children with Neuromotor Dysfunction* (1990), a full-length text, still in print.
- § *Serial Casts: Their Use in the Management of Spasticity-Induced Foot Deformity* (1990), an illustrated manual, still in print.
- § *Legs & Feet: A Review of Musculoskeletal Assessments* (1997, revised 2005), an instructional DVD.
- § *Lower Extremity Developmental Features* (2000), a home study monograph for the APTA's Orthopedic Section.
- § *Serial Casting to Restore Soft Tissue Extensibility in the Ankle and Foot* (2000), a monograph.
- § *Serial Casting for the Restoration of Soft Tissue Extensibility in the Ankle and Foot* (2007), a text.
- § *Cast Fabrication Techniques #1: The FlexCast Preparatory AFO* (2000), a videotape and manual set.
- § Several textbook chapters, articles for journals, conference proceedings, and professional newsletters, including a series of articles (2006 and 2007) on Pediatric Orthopedics for the NDTA Network.

A curriculum vita is available upon request.